Lower Pleistocene Fan 1 (LPL F1) Play

Lenticulina 1 and *Valvulineria* "H" biozones

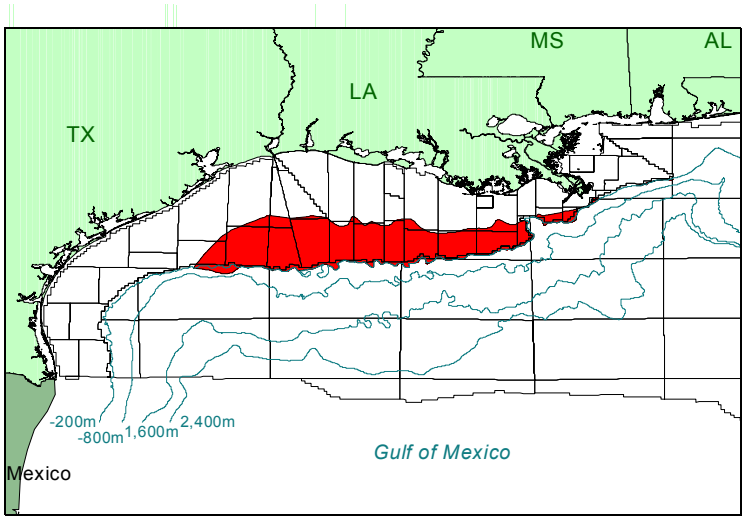

Figure 1. Play location.

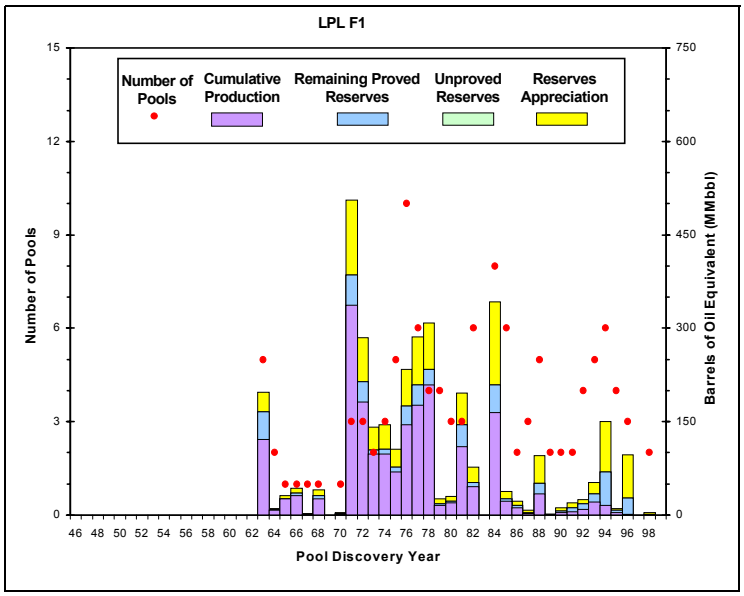

Figure 2. Exploration history graph showing reserves addition and number of pool discoveries by year.

LPL F1 Play 118 Pools 543 Sands	Minimum	Mean	Maximum
Water depth (feet)	95	255	930
Subsea depth (feet)	5715	9608	16267
Number of sands per pool	1	5	26
Porosity	20%	29%	35%
Water saturation	16%	26%	51%

Table 1. Pool attributes. Values are volume-weighted averages of individual reservoir attributes.

Play Description

The established Lower Pleistocene Fan 1 (LPL F1) play occurs within the *Lenticulina* 1 and *Valvulineria* "H" biozones. The play is also defined by deep-sea fan sediments in an extensional structural regime of salt-withdrawal basins and extensive listric faulting located on the modern Gulf of Mexico Region shelf. The LPL F1 play extends from the Galveston/East Breaks Areas offshore Texas to the South Pass/Mississippi Canyon Areas near the present-day Mississippi River Delta (figure 1).

The play is bounded updip by the shelf/slope break associated with the *Lenticulina* 1 biozone and grades into the sediments of the Lower Pleistocene Progradational (LPL P1) play. The LPL F1 play does not extend farther to the west because of a lack of sediment influx into offshore Texas during LPL time. To the northeast, the play grades into sediments of the LPL P1 play. The southern limit of the play is the structural boundary of the Lower Pleistocene Fan 2 (LPL F2) play.

Play Characteristics

The LPL F1 play is characterized by deepwater turbidites deposited basinward of the LPL shelf margin on the upper and lower slopes, in topographically low areas between salt structure highs, and on the abyssal plain. Component depositional facies include channel/levee complexes, sheet-sand lobes, interlobes, lobe fringes, and slumps. These deep-sea fan systems are often overlain by thick shale intervals representative of zones of sand bypass on the shelf, or sand-poor zones on the slope.

Almost one-third of the fields in the LPL F1 play are structurally associated with salt diapirs with hydrocarbons trapped on diapir flanks or in sediments draped over

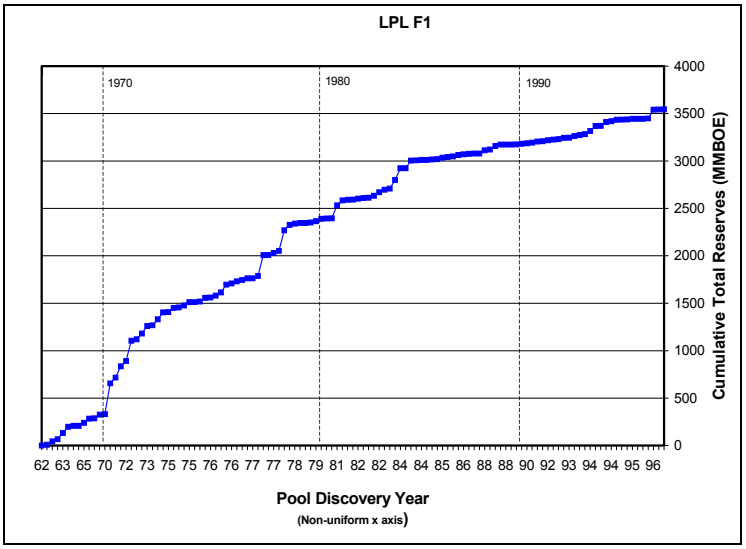

Figure 3. Plot of pools showing cumulative reserves by discovery order. Note the non-uniform x axis.

LPL F1 Play Marginal Probability = 1.00	Number of Pools	Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)
Reserves				
Original proved	115	0.703	10.087	2.498
Cumulative production	--	0.561	8.176	2.016
Remaining proved	--	0.142	1.910	0.482
Unproved	3	<0.001	0.018	0.003
Appreciation (P & U)	--	0.308	4.129	1.043
Undiscovered Conventionally Recoverable Resources				
95th percentile	--	0.192	3.375	0.823
Mean	52	0.265	3.872	0.954
5th percentile	--	0.376	4.343	1.101
Total Endowment				
95th percentile	--	1.203	17.608	4.367
Mean	170	1.276	18.105	4.498
5th percentile	--	1.387	18.576	4.645

Table 2. Assessment results for reserves, undiscovered conventionally recoverable resources, and total endowment.

diapir tops. Another third of the fields are associated with simple anticlines and growth fault anticlines. Less common trapping structures in the play are normal faults, and a few fields contain hydrocarbon accumulations trapped by permeability barriers, updip pinchouts or facies changes. Seals are provided by the juxtaposition of reservoir sands with shales and salt, either structurally (e.g., faulting, diapirism) or stratigraphically (e.g., lateral shale-outs, overlying shales).

Discoveries

The LPL F1 mixed oil and gas play contains total reserves of 1.011 Bbo and 14.233 Tcfg (3.544 BBOE), of which 0.561 Bbo and 8.176 Tcfg (2.016 BBOE) have been produced. The play contains 543 producible sands in 118 pools of which 115 contain proved reserves (table 1; refer to the Methodology section for a discussion of reservoirs, sands, and pools).

The first reserves in the play were discovered 1963 in the South Timbalier 219 field (figure 2). Pool discoveries peaked in 1976 at 10, and have averaged about three per year throughout the play's history. Maximum total reserves of 505 MMBOE were found in 1971 in 3 pools, including the largest pool in the play in the Eugene Island 330 field, with 325 MMBOE in total reserves (figures 2 and 3). The most recent discoveries, prior to this study's cutoff date of January 1, 1999, were in 1998. Ninety-seven percent of the cumulative production and 90 percent of total reserves from this play are from pools discovered before 1990.

The 118 discovered pools contain 1,097 reservoirs, of which 664 are nonassociated gas, 332 are undersaturated oil, and 101 are saturated oil. Cumulative production has consisted of 72 percent gas and 28 percent oil.

Of the 87 assessed plays in the Gulf of Mexico, the LPL F1 play is the fourth largest on the basis of BOE total reserves. Of the 14 F1 plays, the

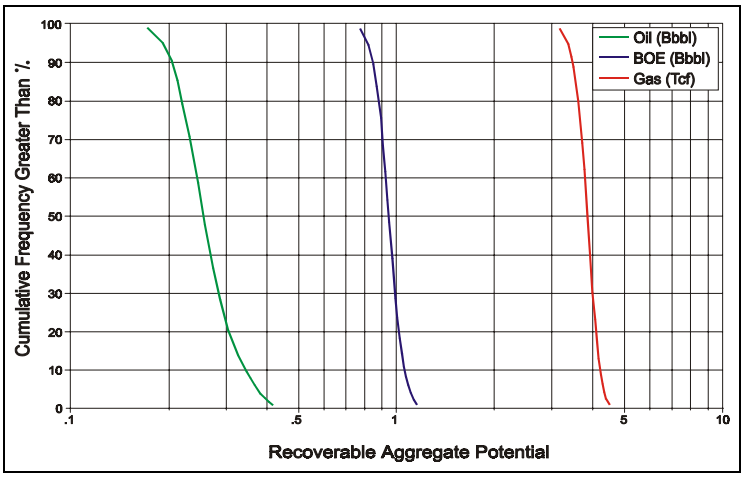

Figure 4. Cumulative probability distribution for undiscovered conventionally recoverable resources.

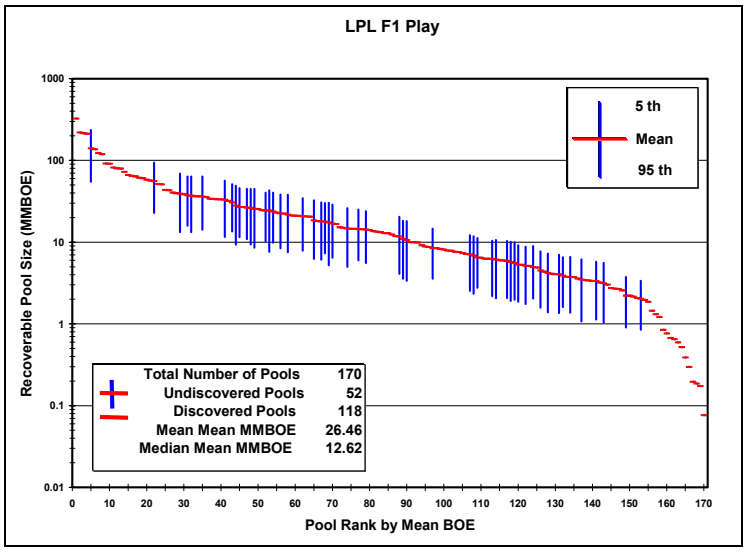

Figure 5. Pool rank plot showing the number of discovered pools (red lines) and the number of pools forecast as remaining to be discovered (blue bars).

LPL F1 play is the largest, containing 35 percent of F1 BOE total reserves and accounting for 40 percent of F1 BOE cumulative production.

Assessment Results

The marginal probability of hydrocarbons for the LPL F1 play is 1.00. This play has a mean total endowment of 1.276 Bbo and 18.105 Tcfg (4.498 BBOE) (table 2). Forty-five percent of this BOE mean total endowment has been produced.

Assessment results indicate that undiscovered conventionally recoverable resources (UCRR) have a range of 0.192 to 0.376 Bbo and 3.375 to 4.343 Tcfg at the 95th and 5th percentiles, respectively (figure 4). Mean UCRR are estimated at 0.265 Bbo and 3.872 Tcfg (0.954 BBOE). These undiscovered resources might occur in as many as 52 pools. The largest undiscovered pool, with a mean size of 140 MMBOE, is forecast as the fifth largest pool in the play (figure 5). The forecast places the next four largest undiscovered pools in positions 22, 29, 31, and 32 on the pool rank plot. For all the undiscovered pools in the LPL F1 play, the mean mean size is 18 MMBOE, which is smaller than the 30 MMBOE mean size of the discovered pools. The mean mean size for all pools, including both discovered and undiscovered, is 26 MMBOE.

BOE mean UCRR contribute only 21 percent to the LPL F1 play's BOE mean total endowment, but the play is forecast to contain a billion BOE in UCRR. Future discoveries will continue be made in structural and stratigraphic traps around salt structures, and by deeper drilling within existing fields.